

NON-PUBLIC?: N  
ACCESSION #: 9210020224  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Salem Generating Station - Unit 2 PAGE: 1 OF 6

DOCKET NUMBER: 05000311

TITLE: Reactor trip from 100% power upon opening of the 2A Reactor Trip Breaker.

EVENT DATE: 09/03/92 LER #: 92-014-00 REPORT DATE: 09/24/92

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: M.J. Pollack - LER Coordinator TELEPHONE: (609) 339-2022

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On 9/3/92, at 0917 hours a reactor trip occurred due to the "A" Reactor Trip Breaker (RTB) opening. Following the reactor trip, a cooldown occurred. Auxiliary Feedwater was reduced and the MS10 valves (atmospheric relief valves) were verified closed. However, the cooldown continued and manual Main Steamline Isolation (MSI) was initiated stopping the cooldown. After the MSI, Reactor Coolant System (RCS) pressure and temperature reached maximum levels of 280 psig and 552 degrees F. The Pressurizer Master Controller was taken to manual. Pressurizer spray was initiated and pressure reduced and stabilized at 2235 psig. At 0936 hours, the 21MS15 and 22MS15 main steam safety valves lifted. The 21MS10 and 22MS10 valves had not opened. At 1005 hours, an "Unusual Event" was declared for, "SG Safety Failure to Reseat". The Unusual Event was terminated with the plant in Mode 3. Investigation of this event included testing of the "2A" RTB which did not identify any

RTB problems. The cause of the reactor trip is attributed to personnel error. An NEO exhibited poor judgement resulting in a sequence of events leading to the trip. Appropriate disciplinary action has been taken with the individual involved. The reactor trip and events following the trip will be reviewed by the Nuclear Training Center. Investigation of a Pressurizer pressure master controller concern is continuing. The MS10 control concerns have been investigated by engineering and design changes are planned. The breaker in the "2A" RTB cabinet is being sent to Westinghouse to verify that it functions per design.

END OF ABSTRACT

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#### PLANT AND SYSTEM IDENTIFICATION:

Westinghouse - Pressurized Water Reactor

Energy Industry Identification System (EIIS) codes are identified in the text as {xx}

#### IDENTIFICATION OF OCCURRENCE:

Reactor Trip from 100% power upon opening of the 2A Reactor Trip Breaker

Event Date: 9/3/92

Report Date: 9/24/92

This report was initiated by Incident Report No. 92-567.

#### CONDITIONS PRIOR TO OCCURRENCE:

Mode 1 Reactor Power 100% - Unit Load 1150 MWe

#### DESCRIPTION OF OCCURRENCE:

On September 3, 1992, at 0917 hours, during normal power operation, a reactor trip occurred with a first out alarm of "power range neutron flux rate high". At the time of the event, no maintenance was in progress which could be attributed to the trip.

Investigation revealed that the "A" Reactor Trip Breaker (RTB) had opened resulting in the control rods dropping into the core causing the negative rate reactor trip signal. Per design, the "B" RTB

opened approximately 22 cycles after event initiation. The turbine/generator tripped following the reactor trip.

Following the reactor trip, a cooldown occurred. In accordance with Emergency Operating Procedure EOP-TRIP-2, Auxiliary Feedwater was reduced from 44E04 lb sub m/hr to 22E04 sub m/hr and the MS10 valves (atmospheric relief valves) were verified closed. However, the cooldown continued and, at 0921 hours, a manual Main Steamline Isolation (MSI) (an Engineered Safety Feature) was initiated stopping the cooldown, in accordance with the EOP procedure.

After the MSI, Reactor Coolant System (RCS) {AB} pressure and temperature reached maximum levels of 2280 psig and 552 degrees F, respectively. Based upon an elevated Pressurizer Pressure Operated Relief Valve (PORV) tailpipe temperature of 191 degrees F, and pressure spikes observed in the Pressurizer Relief Tank (PRT), the Pressurizer Master Controller was taken to manual. Pressurizer Spray was initiated and pressure reduced and stabilized at 2235 psig. The Pressurizer Power Operated Relief Valves (PORVs) were not observed to have lifted.

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#### DESCRIPTION OF OCCURRENCE: (cont'd)

At 0936 hours, the 21MS15 and 22MS15 main steam safety valves lifted. Main steamline pressure was 1052 psig. This is above the 1000 psig setpoint for the 21MS10 and 22MS10 valves; however, they did not open. This allowed T sub avg to rise subsequently causing steam pressure to rise until the MS15 valve setpoints were reached.

At 0952 hours, the two (2) MS15 valves were still open with steamline pressure at 980 psig. Consequently at 1005 hours, an "Unusual Event" was declared in accordance with Section 2A of the Emergency Classification Guide, "SG Safety Failure to Reseat".

At 1029 and 1041 hours, respectively, the 21 & 22MS15 valves were observed closed. Plant heatup was then initiated from an initial T sub avg of 530 degrees F to minimize risk of safety injection. The T sub avg setpoint is  $\geq 541$  degree F for safety injection logic of low T sub avg coincident with high steam flow in two of four steamlines.

At 1235 hours, the plant heatup was terminated due to observed steam release from the 21 and 22MS15 valves. Procedure IOP-6, "Hot Standby to Cold Shutdown" was initiated. At 1300 hours, a plant

cooldown commenced. Upon reaching a T sub avg with the 21 and 22MS15 valves observed to be fully closed 0, the Unusual Event was terminated. The plant remained in Mode 3 (Hot Standby) pending results of investigations into the reactor trip and subsequent plant transient.

The Nuclear Regulatory Commission (NRC) was notified of the events associated with the reactor trip, main steamline isolation and the declared Unusual Event in accordance with Code of Federal Regulations 10CFR 50.72.

#### APPARENT CAUSE OF OCCURRENCE:

Investigation of this event included testing of the "2A" RTB. This testing included: 1) physical manipulation of the breaker to cause it to trip; 2) performing portions of the procedure for "Reactor Trip Bypass AIR Circuit Breaker Semi-Annual Inspection, Lubrication and Testing"; 3) performing the procedure for "Train A Reactor Trip and Reactor Trip Bypass Breakers P-4 Permissive Test" several times; 4) removing the "2A" RTB from its cubicle and inspecting it relative to recent NPRDS data; and 5) additional field testing which included monitoring during a breaker trip.

Additional investigations included visual inspection of the Solid State Protection System (SSPS) UV card and megger/resistance tests of the cable from the SSPS to the "2A" RTB cubicle.

The above testing and inspections did not identify any RTB problems which would have resulted in the breaker opening.

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#### APPARENT CAUSE OF OCCURRENCE: (cont'd)

Prior to the trip, a Nuclear Equipment Operator (NEO), was assigned to rack in the Salem Unit 1 "1B" Reactor Trip Bypass Breaker (RTBB) in support of surveillance testing. After entering the Unit 1 Switchgear Room, the NEO left the I&C technicians and went to the Unit 2 Switchgear Room to view the Unit 2 "2A" RTBB. He did this to reassure himself of the appearance of a racked out breaker. Upon entering the Unit 2 Switchgear Room, he states that he opened the "2A" RTBB door and studied the position of the racked out breaker for several seconds. While viewing the breaker, he heard the Unit 2 RTBs open.

Based on investigation, the cause of the reactor trip is attributed

to personnel error. It was determined that the NEO exhibited poor judgement resulting in a sequence of events leading to the trip. The NEO did not inform the Control Room or seek supervisory guidance before going to the "2A" RTBB cabinet to open it. The cabinet is clearly marked as a trip hazard. Also, the NEO stated that he was not aware of procedure S1.OP-SO.RCP-0002, "Reactor Trip or Reactor Trip Bypass Operations". It details the operation of the RTBs. Due to the nature of this procedure, it is not required to be at the job site in support of work since the procedure tasks involve routine equipment operation.

Further review of this event revealed that the physical arrangement of the Salem Unit 1 and Salem Unit 2 RTBB and RTB cabinets are reversed. This factor contributed to the determination that the NEO opened the "2A" RTB cabinet instead of the "2A" RTBB cabinet.

#### ANALYSIS OF OCCURRENCE:

There are two (2) reactor trip breakers ("A" and "B") in series, which connect the output of the rod drive motor generator sets to the rod control power cabinets. In the event of a reactor trip signal, these breakers open, removing power from the control rod drive mechanisms allowing the control rods to drop into the reactor core. The opening of either breaker will cause this to occur. Two (2) RTBBs are provided to allow surveillance testing at power.

The sequence of events as recorded by the P-250 computer confirmed that the "2A" RTB opened first. The first out indication would be the "power range neutron flux rate high" and the "2B" RTB would open a few cycles later.

The reduction in T sub avg requiring MSI, has been experienced during other reactor trips (e.g., Unit 2 LER 311/92-009-00). Engineering has investigate T sub avg reduction (during trips) and design modifications are being assessed.

A low pressurizer level signal occurred resulting in RCS letdown isolation. This signal was due to the cooldown (prior to MSI) and

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#### ANALYSIS OF OCCURRENCE: (cont'd)

the low power history of the core. Charging flow remained established resulting in an increase of pressurizer pressure to approximately 2280 psig. The pressurizer spray actuation setpoint

is 2260 psig. As stated previously, the operators placed the master pressure controller in manual and initiated pressurizer spray. Investigation of this concern included performance of applicable sections of procedure 2PD-2.1.082, "2PC-455K Pressurizer Pressure Control". The controller was calibrated and its operability was checked and found satisfactory. Investigation into the pressurizer master controller concern is continuing.

Following the main steamline isolation, the 21 and 22MS15 valves lifted with the RCS at a temperature of 552 degrees F. This correlates to a steam generator header pressure of 1051 psig. Recorded steam pressures for the 21 and 22 steamlines were 1030 psig and 1036 psig, respectively. Each valve lifted at least twice prior to plant stabilization at 1400 ours. There are five (5) main steamline safety valves per steamline with the MS15 valves having the lowest setpoint (1070 psig).

These valves operated for approximately one (1) hour during the event. The steam flow that passed through the valves during the time they were open heated the valve body and springs. This results in lift set and reset pressure reduction. Following the event, the valves were lift set tested. The as found data were 1047 psig for 21MS15 and 1017 psig for 22MS15. The 1017 psig for the 22MS15 is questionable due to a failed air motor. Both valves were recalibrated and left within 1% of set pressure.

Further investigation revealed that the 23MS15 valve reached a pressure of 1045 psig; however, it did not lift. It was lift set tested with as found readings of 1097 psig. It too was recalibrated.

The valve manufacturer (Crosby) was contacted. No abnormalities or inconsistencies were noted with the MS15 valve operation or subsequent findings.

Main steamline safety valve lifting has occurred previously. On August 8, 1985 reference LER 311/85-005-00), a similar event occurred where the "2A" RTB opened followed by the lifting of main steamline safety valves. Following the 1985 event, investigation was conducted to determine why the MS10 valves did not respond preventing the main steamline safety valve lift. It was determined that the MS10 controllers (set at 1000 psig) experience saturation and a subsequent "reset windup" phenomenon. Design changes are planned to address this concern.

The reactor trip and subsequent opening of the MS15 valves did not affect the health and safety of the public. Operator actions were appropriate to mitigate the subsequent transient. The reactor trip

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#### ANALYSIS OF OCCURRENCE: (cont'd)

and manual main steamline isolation events are reportable to the NRC in accordance with Code of Federal Regulations 10CFR 50.73(a)(2)(iv).

#### CORRECTIVE ACTION:

Operations management has reviewed the events associated with the reactor trip. Appropriate disciplinary action is being assessed regarding the individual involved in the event.

The reactor trip and events following the trip will be reviewed by the Nuclear Training Center. Licensed and non-licensed Operator training will be enhanced as appropriate.

Administrative procedure NC.NA-AP.ZZ-0005(Q), "Station Operating Practices", will be revised to require shift notification and approval for accessing equipment posted with "Trip Hazard" signs.

As identified in the Description of Occurrence section, a Pressurizer pressure control concern occurred. Investigation included performance of applicable sections of procedure 2PD-2.1.082, "2PC-455K Pressurizer Pressure Control". The controller was calibrated and its operability was checked and found satisfactory. Investigation into the pressurizer master controller concern is continuing.

The MS10 control concerns have been investigated by engineering. Modifications are planned for MS10 controls. The effects of "reset wind-up" phenomenon will be accounted for so that the valves will operate at their proper setpoint.

The breaker in the "2A" RTB cabinet, at the time of the trip, is being sent to Westinghouse to verify that it functions per design.

General Manager -  
Salem Operations

MJP:pc

SORC Mtg. 92-105

ATTACHMENT 1 TO 9210020224 PAGE 1 OF 1

PSEG  
Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge,  
New Jersey 08038

Salem Generating Station

September 24, 1992

U. S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

Dear Sir:

SALEM GENERATING STATION  
LICENSE NO. DPR-75  
DOCKET NO. 50-311  
UNIT NO. 2

LICENSEE EVENT REPORT 92-014-00

This Licensee Event Report is being submitted pursuant to the  
requirements of the Code of Federal Regulations 10CFR 50.73 (a) (2) (iv)  
This report is required to be issued within thirty (30) days of event  
discovery.

Sincerely yours,

C. A. Vondra  
General Manager -  
Salem Operations

MJP:pc

Distribution

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